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Introduction

Cull cows comprise about one third of all cattle slaughtered at export premises in Ireland. Approximately 80% of these are dairy cull cows. A small number of cows are unsuitable for fattening because of ill-health or old age. Cows in Ireland calve mainly in the Spring and the major culling periods are in early Spring and late Autumn. Cull cows are often in unfinished condition at slaughter since concentrate inputs during lactation are generally low. Carcase weights of cull cows are low with the potential to reach heavier weights prior to slaughter. When cull cows are fattened, a greater weight of more valuable meat is produced and the finished cows are sold when market prices are better. The aim of this study was to evaluate the profitability, meat quality characteristics and weight distribution of meat from cull cows, some of which were slaughtered immediately on culling and some of which were finished on pasture.

Materials and Methods

In April 1983, a total of 44 cull cows were divided into two groups, each of which contained 10 "Boner" class, 9 "Medium" class and 3 "Best" class animals. Group I was slaughtered immediately and Group II was pasture fed for three months before being slaughtered. After slaughter and ten days storage at 4°C, the carcasses were weighed and dissected into primal cuts, fat, bone and trimmings and the weights of each were recorded. Tenderisation - Steaks were cut from the striploin (*longissimus dorsi*) and the eye of the round (*semitendinosus*) of each carcase before and after mechanical tenderisation using needles at 5 blades per square centimetre. The steaks were vacuum packed and frozen until required for analysis. Cooking and Analysis - The steaks were cooked in a convection oven at 150°C to an internal temperature of 72°C. Taste panel analysis for colour, tenderness, juiciness, flavour and overall desirability was carried out by judges experienced in the tasting of meat. pH values and cooking losses were determined by standard methods. Tenderness measurements were done using an Instron Universal Testing machine fitted with a Warner Bratzler Shearing device. Cores of 1.25cm diameter were cut from the meat and sheared at a cross-head speed of 20cm min<sup>-1</sup>.

Results and Discussion

In general, the younger animals were in better condition than the older ones and as a consequence, a greater proportion of older animals were in the "Boner" class. The differences in carcase weights between fore and hind were not significant within or

between groups (Table 1). However, there was a trend towards the carcasses from the better animals having a higher percentage as hind than the medium and boner carcasses. The overall average carcase weight at the beginning of the experiment was 205 kg whereas after finishing on pasture this had risen to 269 kg. The animals classified as best in Group I had the highest average carcase weight. Those corresponding to the animals which had been classified as medium in Group I had the highest average carcase weight in Group II. The kill-out percentage increased from an overall average of 50 in Group I to 53 in Group II.

The weight gain during the finishing period was greatest for the animals corresponding to those classified as medium in Group I, having an average gain of 0.96 kg per day. This compares favourably with the rate of weight gain for beef animals. The greatest gains (over 1.2 kg per day) were shown by animals with large carcase frames and poorest initial condition scores. Most of the weight gained was meat with relatively little bone being laid down during the finishing period. The overall average percentage of the carcase as bone in Group I was 26.7% compared with 23.5% in Group II. There was no significant increase in the amount of fat in the carcasses as a result of finishing, whereas the % meat in the carcasses increased by approximately 4%.

A summary of hindquarter breakdown into the individual cuts from Groups I and II is shown in Table 2. The overall average percentages of topside/silverside showed the greatest increase as a result of finishing. No similar comparisons can be made for forequarter as the forequarters of the poorer animals in Group I were classified as trimmings. In general, the increase in weight was evenly distributed between the fore and hind quarters. The pH of the drip from the meat showed little variation either between or within groups. Most pH values fell within the range 5.7 - 5.8 and tenderising had no effect on pH. There was no significant difference in cooking losses between or within groups. Average cooking loss values ranged from 24 - 27% for untenderised meat and approximately 2% higher for tenderised meat. Physical Characteristics - A judging panel found no significant differences in colour between Groups I and II (Table 3). Older animals in both groups had darker meat which scored lower. Panel scores for flavour and juiciness were lower for the poorer animals than the better animals in Group I but these differences were not evident in Group II. Tenderising had no effect on colour or flavour but gave a slight enhancement of juiciness scores. The overall desirability was greatest for best animals in Group I and tenderising had the effect of reducing the differences within the group. In Group II those animals corresponding to the medium class in Group I were considered to be most desirable. This trend was confirmed by the shear analysis, while the order in Group I was Boner tougher than Med. In Group II this had changed to Boner tougher than Best tougher than Medium. In all cases tenderising reduced the shear values and also reduced the differences between different classes of meat. In summary, cull cows in poor condition and with large frames when fed on pasture show substantial weight gains. The quality of this meat is quite acceptable particularly if mechanically tenderised.

Table 1 - Liveweight and Carcase Date for Cull Cows from Groups I and II

	Group I				Group II			
	Over all	Boner	Med.	Best	Over all	Boner	Med.	Best
Previous number of Lactations	2.7	3.2	2.0	3.5	2.9	3.3	1.7	1.7
% of Carc. as Fore	50.8	51.3	50.4	50.3	50.9	51.1	50.9	50.8
% of Carc. as Hind	49.2	48.7	49.7	49.7	49.1	48.9	49.1	49.7
Fasted Live Wt. 18-4-83 (kg)	412.7	384.0	430.7	475.5	433.6	410.5	453.4	451.0
Fasted Live Wt. 7-7-83 (kg)	-	-	-	-	502.5	476.2	530.1	507.0
Carc. Weight	207.6	185.5	210.8	244.1	268.8	252.1	286.9	269.7
Killout %	50.3	48.3	48.9	51.3	53.5	52.9	54.1	53.1
Wt. Gain kg/day	-	-	-	-	0.86	0.82	0.96	0.7
% of Carc. as Bone	26.7	28.6	29.0	22.1	22.9	23.5	22.1	23.1
% of Carc. as Fat	4.4	2.7	5.9	6.8	5.4	4.6	6.6	4.8
% of Carc. as Meat	69.0	69.1	68.1	71.1	71.6	71.9	71.3	72.1

Table 2 - Hindquarter breakdown for Cull Cows from Groups I and II

	Group I					Best
	Overall Average	%	Weight/Kg	Boner	Medium	
% Hind as:						
Topside/Silverside	24.7	25.2	24.5	24.9		24.6
Thick Flank	8.8	9.0	8.9	8.9		8.1
Rump	8.0	8.2	7.9	8.0		8.1
Fillet	3.9	4.0	3.9	3.9		3.6
Striploin	7.7	7.9	6.7	8.2		9.2
Shin	6.4	6.5	6.5	6.3		6.5
Trimmings	10.5	10.7	11.3	9.6		10.9
Bone	24.5	25.0	26.7	23.7		19.2
Fat	5.6	5.7	3.6	6.4		9.7
	Group II					Best
	Overall Average	%	Weight/kg	Boner	Medium	
% Hind as:						
Topside/Silverside	24.4	32.2	24.9	23.6		24.9
Thick Flank	8.5	11.2	8.9	8.2		8.5
Rump	8.3	10.9	8.2	8.0		9.1
Fillet	3.3	4.4	3.4	3.1		3.3
Striploin	7.3	9.6	7.9	8.4		8.2
Shin	5.9	7.8	5.9	5.9		6.1
Trimmings	14.6	19.3	14.5	14.9		13.9
Bone	21.5	28.4	22.0	20.1		20.9
Fat	6.3	8.3	4.6	8.5		5.0

Table 3 - Physical and Sensory Characteristics of Cow Beef  
Groups I and II

Untenderised	Group I				Group II			
	Over all	Boner	Med.	Best	Over all	Boner	Med.	Best
Colour	6.04	5.84	6.16	6.34	6.37	5.98	6.78	6.47
Tenderness	3.95	3.79	4.10	4.07	5.47	5.33	5.41	6.18
Juiciness	4.30	3.90	4.54	4.93	4.62	4.82	4.24	5.06
Flavour	4.57	4.15	4.62	5.80	5.64	5.78	5.47	5.68
Overall Desirability	3.79	3.64	3.79	4.30	4.96	4.51	5.38	5.23
Shear/Kg	6.74	7.01	6.56	6.39	6.27	6.46	6.10	6.19

  

Tenderised	Group I				Group II			
	Over all	Boner	Med.	Best	Over all	Boner	Med.	Best
Colour	5.91	5.69	6.03	6.27	5.83	5.62	5.97	6.08
Tenderness	5.3	5.24	5.37	5.29	5.62	5.42	5.65	6.21
Juiciness	4.62	4.28	4.85	5.08	5.15	5.10	5.16	5.30
Flavour	5.46	5.21	5.75	5.37	5.96	5.99	5.87	6.11
Overall Desirability	4.30	4.26	4.37	4.24	5.12	5.07	5.11	5.29
Shear/Kg	6.09	6.45	5.79	5.84	5.45	5.96	5.14	4.66